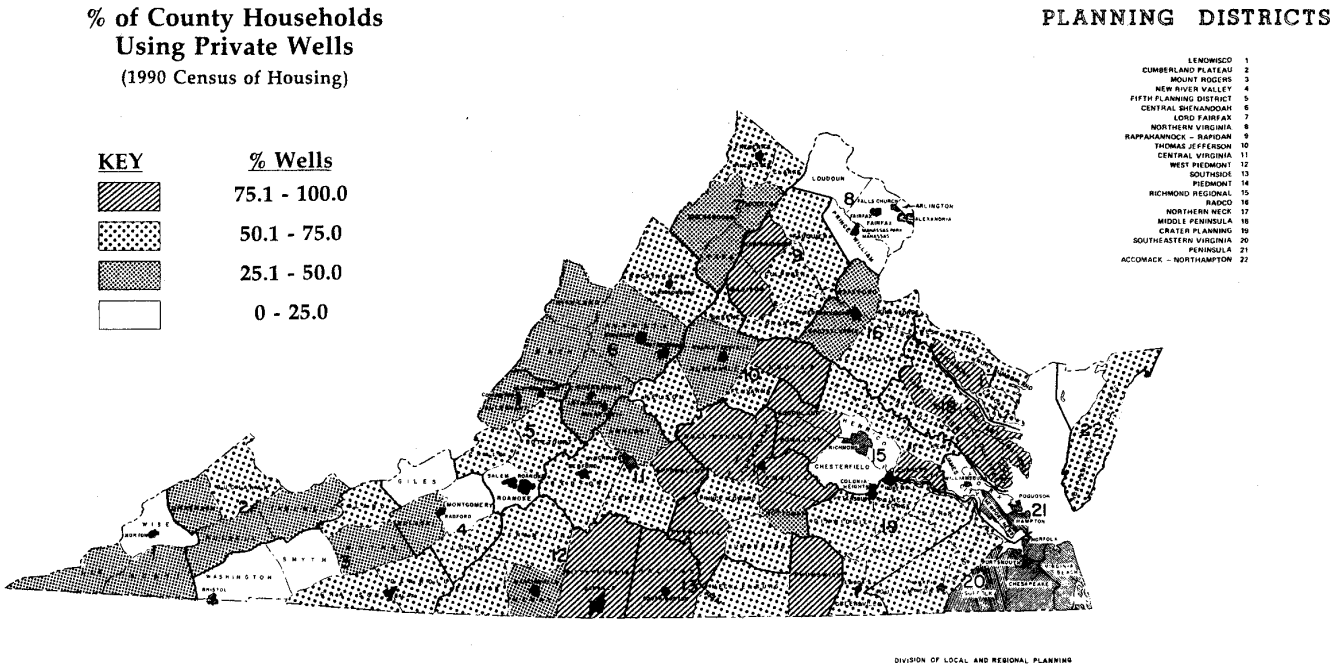
1992 *Groundwater Protection in Virginia*

Fifth Annual Report of the Groundwater Protection Steering Committee



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The Year In Perspective

Last year's Annual Report identified 5 challenges in the road ahead for groundwater protection in Virginia - not the least of which were funding and staffing constraints. These obstacles are still present but the good news is that significant progress has been made during 1991 and the first half of 1992.

A glance at the Table of Contents for this Annual Report reveals that advances have been made in policy, in program refinement, in research and in outreach and publications. Despite the expectation that this might be a slow year for progress, much has been accomplished.

– Groundwater Protection Steering Committee

Census Shows Wells Crucial To Virginia Households

The 1990 Census of Housing has recently released figures about household water supply in Virginia. What these numbers reveal is that:

- in 60 of Virginia's 95 counties, the majority of households continue to obtain water from private wells (see map on page 1)
- most of these "private well dominant" counties (83%) are east of the Blue Ridge Mountains
- Amelia County, east of Farmville, has the highest private well percentage (96%) while Arlington County has the least (less than 1%)
- in 52 of Virginia's 95 counties, the increase in the number of households served by private wells was greater than the number added to public systems between 1980 and 1990 - for these counties, wells are growing in importance
- dug wells which draw water from shallow aquifers exist in all 95 counties - in one county as many as 43% of the wells are in this category.

It should be noted that these census figures refer only to individual household wells and do not include public water supply systems that also use groundwater.

Statewide, 22% of Virginia's households in 1990 reported private wells as their source of water. This is down slightly from the 23% found in 1980 and the 24% in 1970.

Excluding incorporated cities , 33% of county households in Virginia in 1990 relied on private wells. Again this proportion has held fairly constant with only slight decreases noted since 1980 (35%) and 1970 (37%). This long term trend suggests that private wells will continue to play a crucial role in supplying water to Virginia households for many years to come.

When county by county household water source figures are examined, the range is quite large. In 60 of the 95 counties, more than half of the households rely on private wells. The top ten counties are:

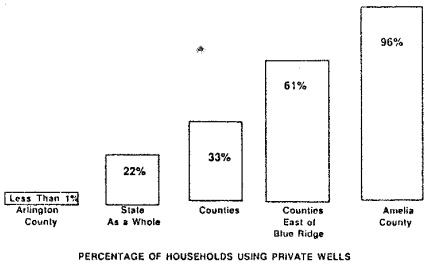
Top Ten Counties	% of Households Using Private Wells in 1990
Amelia	96.13
King & Queen	96.11
Matthews	95.79
Powhatan	94.60
Charles City	90.54
Cumberland	88.14
Buckingham	85.96
Goochland	85.89
Middlesex	84.82
Gloucester	84.28

West of the Blue Ridge Mountains the percentages are lower with only three counties exceeding 60%. Least reliant on private wells are the counties of Northern Virginia, the Richmond area and parts of Tidewater as well as Washington County outside Bristol in Southwest Virginia. A combination of the degree of urbanization, topography, and the availability of good quality/ quantity groundwater probably accounts for these patterns.

New wells were constructed at a rapid rate in many locations over the 1980-90 decade. Approximately 84,000 wells were added statewide in that period. This compares to approximately 431,000 new public system hook-ups. Statewide public service hook-ups are more numerous by a factor of 5 to 1 reflecting growth in urban and suburban areas. In 52 of Virginia's 95 counties, however, new wells actually exceeded new public system hook-ups. The top ten counties in terms of new well construction between 1980 and 1990 are:

Top Ten Counties	Private Wells Added 1980 - 1990
Bedford	4,504
Gloucester	3,883
Franklin	3,863
Prince William	3,491
Rockingham	3,018
Fauquier	2,930
Augusta	2,612
Spotsylvania	2,383
Louisa	2,102
Frederick	2,019

These and other localities like them which are growing and relying heavily on private wells need to incorporate groundwater considerations into their local planning and development decision-making.



PERCENTAGE OF HOUSEHOLDS USING PRIVATE WELLS

The Census of Housing also reports the number of dug wells in the state and in each jurisdiction. Dug wells are reported in all 95 of Virginia's counties. Dug wells are significant because they tend to be shallower and tap into the upper water table aquifer which can be vulnerable to a variety of surface and sub-surface contamination sources. Such wells should be carefully assessed and tested and in some cases, replaced with wells meeting current standards or with public supplies. Land use management with groundwater in mind is also especially important in such situations. Counties having the largest number of dug wells are:

Top Ten Counties	Number of Dug Wells (1990)
Hanover	5,116
Henrico	3,271
Spotsylvania	2,820
Chesterfield	2,623
Pittsylvania	2,370
Caroline	2,255
Louisa	2,225
Northumberland	2,211
Stafford	2,150
Middlesex	2,105

All in all the decade of the 1980's seems to represent a continuation of past trends. Private wells continue to play a crucial role in meeting household water supply needs statewide and are virtually the only source of drinking water in many Virginia counties. For this reason, continuing efforts to protect this irreplaceable resource are needed.

It Happens

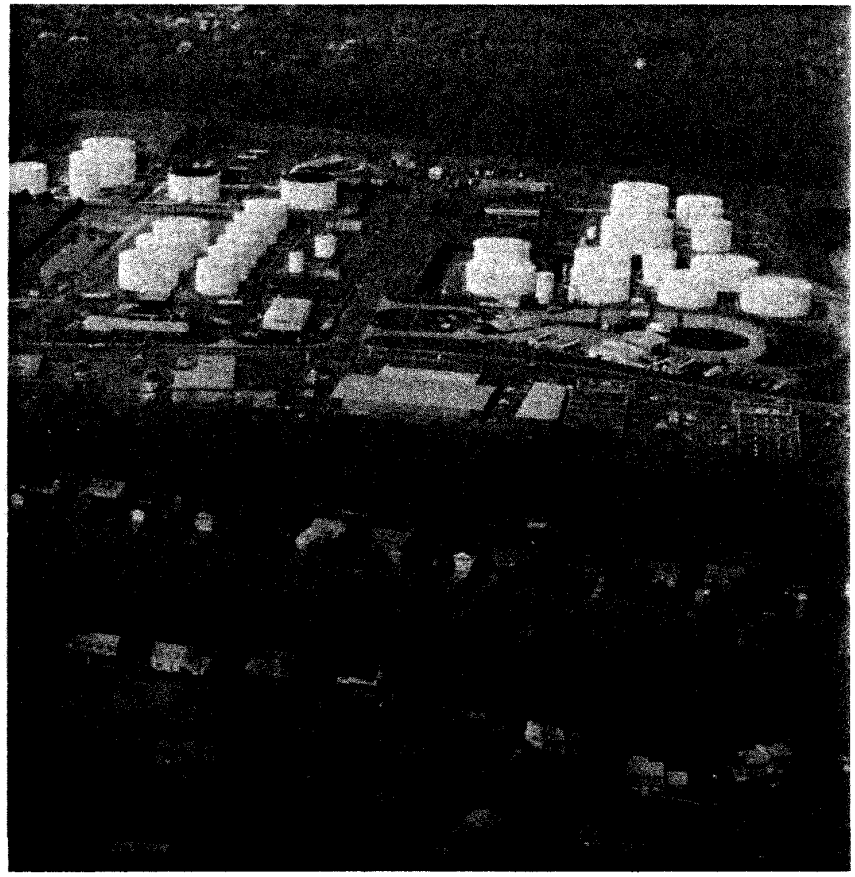
Groundwater does become polluted and as a recent article in *Virginia Town and City* - a publication of the Virginia Municipal League - puts it, "Government officials beware: if a large underground spill is discovered in your jurisdiction, be prepared for a long and expensive struggle." ("The Severe Consequences of Underground Spills" by Walter Alcorn, p. 13, April 1992) The article was stimulated by the oil leak at the Pickett Road Tank Farm in the City of Fairfax. Star Enterprises is working to clean up this oil and Texaco has begun addressing the impact to residents, several of whom have been forced to move due to the hazard posed by fumes in their homes. Neighbors want the entire facility closed - Chevron, Citgo, and Amoco also operate at the site. Fortunately, no public water supplies or private wells have been reported as being impacted by the spill.

Last year's Annual Groundwater Report cited a series of challenges. The first challenge bears repeating

Challenge #1:
Building Groundwater Awareness

Virginians are fortunate that we have not experienced widespread groundwater contamination problems of the type experienced in some other states. As a result, our citizens and leaders have not been forced to confront the urgency or costs of replacing valuable water supplies. Many of us engage in practices as households, as farmers and foresters, as businesses and institutions which seem to us innocent enough but which could, and perhaps do, damage groundwater. Most of us are not aware of this or prefer to wait for some cue that now is the time to change. It is ironic but commonly recognized that the motivation to plan to prevent future problems is strongest after a crisis. The challenge is to find ways to learn from other's mistakes and from our own shortcomings without stubbornly waiting for more serious problems to get our attention.

1991 Annual Report



What can be learned from the Pickett Road case? The Virginia Municipal League article cited above offers the following conclusion and words of advice.

As with any environmental disaster, the best solution is to keep it from ever happening in the first place. Although state law includes a number of spill prevention mechanisms, careful planning by local governments about the proper location for these types of facilities can go a long way in preventing the kind of problems experienced in Fairfax and at other sites around the country.

First, common sense would dictate, and experience with the Fairfax case has proven, that tank farms and other large petroleum handling facilities should be located with utmost care. These are heavy industrial facilities and should be located as far from residential areas as practicable. As with landfills and other large facilities, tank farms also should be located carefully to avoid sensitive environmental areas such as drinking water aquifers and watersheds. Although new technologies have substantially improved leak prevention at new tank farms, remember these facilities will be around for decades and once built, they are near impossible to move.

As the Groundwater Protection Steering Committee has been urging for several years, local governments need to use their land use powers with groundwater protection in mind. No other level of government has land use and locational controls of the sort possessed by local government. Several years ago the Code of Virginia was modified to make it clear that localities do have the authority to use the planning and zoning power to enact reasonable measures to protect groundwater. They, as officials and staff, and we, as citizens, need to use these powers. Groundwater does become polluted. It happens.

New Storage Tank Legislation Adopted

Articles 9, 10, and 11 of State Water Control Law provide for the regulation of underground storage tanks, aboveground storage tanks, vessels, and pipelines for the purposes of preventing and cleaning up pollution from these facilities. During the 1992 session of the General Assembly, significant changes were made to these Articles as they relate to the protection of groundwater resources of the State. The law includes revisions which:

- Require the Water Control Board to adopt regulations to prevent pollution of surface and groundwater due to leaks and overfills from aboveground storage tanks.
- Require adoption of a financial responsibility regulation to ensure compliance with Article 11 for aboveground storage tanks and pipelines.
- Allow for certain categories of aboveground storage tanks to have access to the Virginia Petroleum Storage Tank Fund (VPSTF) for containment and clean-up costs.
- Reduce the corrective action, third party compensation and annual aggregate financial responsibility requirements for certain classes of underground storage tanks. The amended law also allows these classes of underground storage tanks access to VPSTF above the new financial responsibility requirements.
- Allow reimbursement of corrective action costs from VPSTF for farm or residential motor fuel underground storage tanks with a capacity less than 1,100 gallons, heating oil underground storage tanks with a capacity of 5,000 gallons or less and aboveground storage tanks with a capacity of 5,000 gallons or less.
- Revise the fee structure on the sale of motor fuels from one-fifth of one cent to three-fifths of one cent when the fund is operating between three and six million dollars.

For information about the new requirements for aboveground storage tanks and vessels, contact David T. Ormes, Virginia Water Control Board, P. O. Box 11143, Richmond, VA 23230. For information about requirements for underground storage tanks, contact Fred K. Cunningham at the same address.

Oil And Gas Requirements Adopted

The 1992 General Assembly passed two measures affecting groundwater protection around gas and oil exploration and production facilities. The Assembly added a provision to the Virginia Gas and Oil Act, Chapter 22.1 of Title 45.1 of the Code of Virginia, requiring the operator of any gas or oil injection well who causes the contamination or diminution of groundwater within one-quarter mile of the injection well to provide a replacement water supply.

The General Assembly also amended section 62.1-195.1 of the Code of Virginia to modify the prohibition of drilling for gas or oil in Tidewater Virginia, to apply unique operational standards for gas or oil drilling in Tidewater, and to require filing of a discharge contingency plan and proof of financial responsibility prior to commencing operations.

Two studies involving groundwater issues were also authorized by the General Assembly. The House of Delegates Mining and Mineral Resources Committee established a subcommittee to study issues of replacement of lost groundwater supplies in the vicinity of underground coal mining. The Joint Subcommittee studying gas and oil operations in Tidewater is continuing its study to address the need for requirements governing oil drilling.

Also addressing oil and gas requirements, the Department of Mines, Minerals and Energy promulgated two regulations in September, 1991, amending the permitting and operational standards for gas and oil exploration and production operations.

Groundwater Management Act Redrawn

During their 1992 session, the Virginia General Assembly repealed the Groundwater Act of 1973 and passed a new Groundwater Management Act of 1992 which became effective July 1, 1992. The new act establishes groundwater withdrawal rights based on need as opposed to its predecessor, which established withdrawal rights based on maximum daily withdrawal. It is believed that this change will significantly reduce the total groundwater withdrawal rights currently authorized in existing groundwater management areas. The problem leading to the new act is that currently issued permits and certificates could allow depletion or degradation of groundwater supplies in the eastern part of the state.

The Groundwater Management Act of 1992 establishes permits to withdraw groundwater with fixed terms not to exceed ten years and will require all users of more than 300,000 gallons per month, including agricultural users, to obtain groundwater withdrawal permits. Before an application for a new groundwater withdrawal can be considered complete, the new act also requires that the local government certify that the use to which the water will be put meets all necessary zoning requirements.

The Virginia Water Control Board (VWCB) will promulgate regulations to implement this new law during the coming year. For now, the new act allows any user holding a certificate of groundwater right or a permit to continue to withdraw groundwater until the VWCB acts upon an application submitted pursuant to the new act.

To support this new policy, the VWCB has initiated a long term project with the United States Geological Survey to improve groundwater flow modeling in the Virginia Coastal Plain.

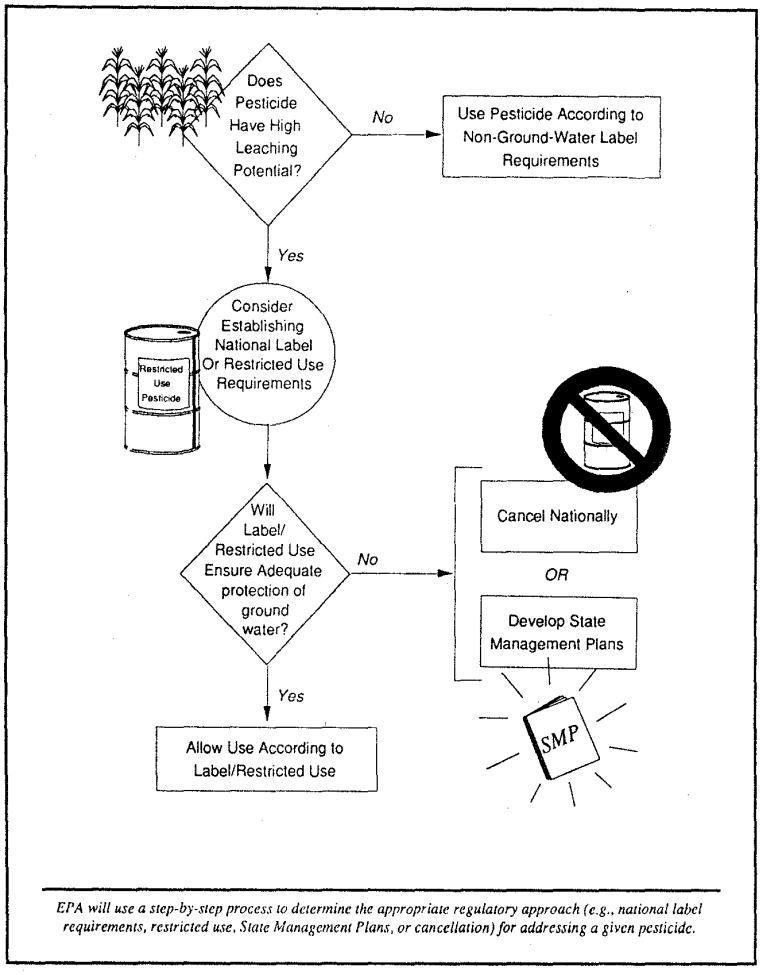
For additional information contact Terry Wagner, Virginia Water Control Board, 804/527-5203.

Pesticides And Groundwater Task Force Is Formed

In October 1991, EPA published its Pesticides and Groundwater Strategy which outlined the direction EPA will take to protect groundwater from pesticide contamination. Heavy reliance is being placed on state level planning as a way of dealing with the great variation among states in terms of agricultural activity, pesticide use, soils and hydrogeology. Connie Musgrove of EPA's Office of Pesticides and Toxic Substances, characterizes state pesticide and groundwater management plans (SMPs) as the "flagship" in EPA's new comprehensive groundwater protection policy.

SMP's are to focus on state and local responses, to emphasize prevention and to take a cross-program approach. EPA is supporting the planning process through coordinated grants to the Department of Agriculture and Consumer Services and the Water Control Board. Under the authority of the Federal Insecticide Fungicide and Rodenticide Act (FIFRA), EPA can require states to develop and implement State Management Plans for specific pesticides which EPA determines are an unusual threat to groundwater. Prior to the SMP requirement for individual pesticides, EPA is encouraging states to develop Generic Plans which broadly address the components of a Pesticide-Specific SMP. In EPA's words, "If a state fails to gain approval within the time period allowed, use of that pesticide within the state will not be permitted. Thus, to ensure continued availability of a pesticide of concern, EPA encourages states to develop Generic Plans prior to the need for a Pesticide-Specific SMP."

The hope is that development of a Generic Plan will ease the development of SMPs for specific pesticides. EPA may require SMPs as soon as 1993. One newly registered pesticide, Amber, was provisionally approved by EPA recently with the proviso that in the future a Pesticide-Specific SMP would be required if data suggests this may be necessary after a two year trial period.



EPA will use a step-by-step process to determine the appropriate regulatory approach (e.g., national label requirements, restricted use, State Management Plans, or cancellation) for addressing a given pesticide.

The Virginia Task Force which began in March, is made up of state agency representatives, representatives of the agriculture and the water-user communities and two citizen advisory boards. Dr. Marvin Lawson, Program Manager of the state's Office of Pesticide Management, is chairing the Task Force. The Institute for Environmental Negotiation, University of Virginia, is facilitating the process and assisting the Task Force. The goal of the Task Force is to have a draft Generic SMP by March 1993 and a final by September 1993. Once the draft is completed, public workshops are planned.

Persons desiring to be placed on a mailing list to be notified about Task Force meetings, can do so by calling the Office of Pesticide Management at 804/371-0152 or the Institute at 804/924-1970. A roster of the members of the Task Force is also available.

Wellhead Protection Moves Forward

The Groundwater Protection Steering Committee will issue a report this fall entitled, **Wellhead Protection: Tools for Local Governments in Virginia.** The report will expand on recommendations developed by the 1990 Ad Hoc Wellhead Protection Committee and discuss implementation of wellhead protection using existing Virginia land use authorities. The document will not be used to develop a statewide program for wellhead protection but rather to educate local policy makers on the importance of wellhead protection (WHP) and to review the applicability of existing land use authorities to achieve protection.

In addition to the publication of this document, the Virginia Water Control Board is coordinating several WHP pilot projects with local

governments. Localities that were represented on the Ad Hoc Committee were invited to compete for funding based on the submittal of proposed workplans. James City County, Henrico County, and Roanoke County will be conducting pilot projects as part of this program. Funding for this project is provided through the EPA Section 106 Groundwater Protection Grant. The pilot projects, expected to be complete by the end of 1992, were undertaken with the objectives of increasing public awareness of WHP issues, evaluating approaches to delineating WHP areas, and examining various policies for implementation of protection strategies.

The Town of Fincastle is also undertaking a pilot wellhead protection program this year. The Town was the successful recipient of a grant directly from the Environmental Protection Agency after a national competition for funds.

Septic System Rule Changes Readied

This past year a Task Force recommended a number of changes to address problems associated with septic system drainfields in areas having high water tables. The state Department of Health is now preparing to take these actions forward through the regulatory amendment process. Action by the Board of Health is expected later this year. The proposed revisions are as follows:

- the minimum stand-off distance to the water table would become

Texture Group	Percolation Rate (minutes per inch)	Stand-Off Distance (inches)
Group I	1 to 16	24
Group II	17 to 45	18
Group III	46 to 90	18
Group IV	90 to 110	18
Group IV	110 to 120	20

Previously the distance for Group I and II soils had been 2 inches.

- minimum installation depth from the surface is proposed to be reduced from 18 to 12 inches for low pressure distribution systems provided that additional cover is included to prevent frost penetration into trenches
- stand off distance to rock is proposed to be at least 12 inches of soil beneath and around a drainfield
- under a proposed new section in the regulations, new technologies developed and demonstrated outside Virginia would be allowed provisionally in the state while more careful evaluation in the field takes place
- all residential septic systems would be required to be pumped every five years - for mass drainfields there would be maintenance and operations requirements by a responsible entity
- owners of lots would be required to show that an adequate supply of potable water can be made available prior to beginning home construction
- mass drainfields would be required to meet a standard of 5.0 mg/l nitrate leaving the property.

Adoption of these changes which were supported by the Secretaries of Health and Human Services, Economic Development and Natural Resources following announcement of the Task Force recommendation, will go far in addressing one of the priority areas established in the 1987 Groundwater Protection Strategy for Virginia and affirmed in its 1990 Supplement.

In other regulatory actions, the Health Department has adopted regulations to cover alternative sewage treatment system requirements for individual single family dwellings. These so-called "package plant" systems had previously been handled by the Water Control Board. The Department has also amended the state's Private Well Regulations by making allowances for "express" approvals for certain classes of wells, by allowing a well on property other than that of the owner if an easement in perpetuity is provided, by reducing the minimum setback from pesticide and termite treated structures when water is drawn from a confined aquifer, by allowing alternate setbacks for heat pump wells and by clarify various provisions regarding casing and grouting of certain wells.

For further information on these regulations and proposals, contact Donald J. Alexander, Director, Bureau of Sewage and Water Services, Virginia Department of Health, P. O. Box 2448, Richmond, VA 23218 or call 804/786-1750.

New EPA Groundwater Strategy Released

In July of 1991, EPA released a report entitled **Protecting the Nation's Groundwater: EPA's Strategy for the 1990's.** This document describes policies and principles that EPA will apply to set forth a more comprehensive and more aggressive approach to protect the nation's groundwater resource. Among the principles reflected in this document are:

- greater emphasis on pollution prevention and a greater balance between prevention and remediation efforts
- greater recognition of the central role played by states and localities
- a shift in EPA's oversight role from a program specific basis to a cross-program or resource based approach
- incentives to be awarded states for showing progress toward comprehensive protections.

The center piece of the EPA strategy is the development of Comprehensive State Groundwater Protection Programs (CSGWPP). EPA held roundtable meetings in each of the regions to obtain state input on the required elements of a CSGWPP as well as adequacy of programs. Along with a delegation from the Virginia Groundwater Protection Steering Committee, representatives from Delaware, Maryland, Pennsylvania, West Virginia, Washington, D.C., and New Jersey, attended a

roundtable in January held at Georgetown University. Bob Burnley of the Water Control Board chaired the Virginia delegation. A variety of suggestions were offered to EPA by the states in what could be characterized as a positive meeting with, at the same time, much skepticism.

For the future, EPA has committed to manage all groundwater related grants in a coordinated fashion to foster development of CSGWPP. States that show progress towards the development of an adequate CSGWPP may at some point have the incentive of increased funding while states that fail to show progress can expect funding cuts. Grants available under the Clean Water Act; Federal Insecticide, Fungicide and Rodenticide Act; Toxics Substance Control Act; Resource Conservation and Recovery Act; Safe Drinking Water Act; and Comprehensive Environmental Response, Compensation and Liability Act will be subject to this coordinated management.

Second Pesticide Pick-Up Program Organized

During 1990 the Virginia Department of Agriculture and Consumer Services (VDACS) and the Virginia Pesticide Control Board (PCB), in cooperation with the VPI & SU Cooperative Extension Service, implemented a Pilot Pesticide Disposal Project, "Clean Day," in three Virginia counties, Frederick, Clarke and Northumberland. The "Clean Day" Pilot Project was a resounding success with over 15 tons of unwanted, banned or canceled pesticide waste collected from 69 agricultural producers.

Based on the success of the 1990 "Clean Day" Pilot Project, VDACS and PCB decided to continue the effort and implement a Pesticide Disposal Program during 1992. To determine the amount of pesticide waste stored by the agricultural community, the VPI & SU Chemical, Drug and Pesticide Unit conducted a statewide survey of agricultural producers in 1991. In addition, VDACS conducted surveys of pesticide dealers and small pest control firms. Based on survey data, as well as environmental, geographic and cropping system considerations, five counties were selected to participate in the 1992 program; Accomack, Nelson, Northampton, Nottoway and Rockingham. The 1992 Pesticide Disposal Program was conducted during June-July.

By picking up and properly disposing of these unwanted and outdated pesticides, the likelihood that point source groundwater contamination will occur is substantially reduced. Funding for future "clean day" projects is not secured and makes it questionable whether other counties in the state will be covered.

Underground Tanks A Continuing Challenge

There are approximately 66,000 regulated underground storage tanks (USTs) at 24,000 facilities throughout the Commonwealth. Over the past three years the number of reported leaking UST sites has increased dramatically to 3,300. As a result, a statewide backlog of clean-up reports requiring VWCB technical review has occurred. In an effort to begin to address this backlog, the VWCB established new positions and shifted staff resources from other groundwater program areas to the UST program. In addition to this increased staffing, the VWCB is piloting a project in the Northern Regional Office which utilizes a consultant to aid in the review and evaluation of reports associated with the clean-ups.

Owners/Operators who clean-up the contamination from their leaking UST site may apply to the Virginia Petroleum Storage Tank Fund for reimbursement of reasonable and necessary corrective action costs above their financial responsibility requirement. The VWCB began reimbursing owner/operators in June 1991 and to date has reimbursed over $2 million while disapproving $550,000 in corrective action claims.

Under a contract with six different geotechnical consulting firms, the VWCB is currently characterizing and conducting initial clean-up activities for 15 sites with leaking USTs where the source of contamination is not known. Since October 1990, the Agency has provided clean sources of drinking water to homes and businesses at 87 different leaking UST locations. Of these 87 alternate water supply sites, 34 sites have been provided with a new well or an extension of an existing public water supply. The other sites have carbon filtration units in place with the VWCB providing the operation and maintenance for these units.

For more information contact David P. Chance, Virginia Water Control Board, P. O. Box 11143, Richmond, VA 23230.

Targetting Virginia's Nonpoint Efforts

The Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation (DCR-DSWC) and the USDA-Soil Conservation Service (SCS) with the cooperation of Virginia Tech's Information Support Systems Laboratory and other nonpoint source (NPS) implementation agencies is proceeding with statewide hydrologic unit planning by identifying NPS water quality problems within 491 individual watershed areas. In water quality assessment, where all pollutant movement is governed by naturally occurring systems, hydrologic units are much more appropriate planning units than political boundaries.

It should be noted that while the focus of this project is on surface waters, in many cases groundwater movement follows a pattern similar to surface waters. Also, many of the surface activities which might bring potential contaminants into contact with surface water can likewise pose threats to subsurface groundwater.

The boundaries of the 491 watersheds, as well as a statewide set of political boundaries, roads, and streams, have been incorporated into the Virginia Geographic Information System (VirGIS) natural resource database. The digital data has been used to produce county-level hydrologic unit maps at a scale of 1" = 2 miles. This data includes information on land use, livestock and poultry, erosion rates, acres of disturbed land, and sludge and fertilizer use within each individual watershed. Surface water quality monitoring data from the State Water Control Board (SWCB) is also being used to evaluate watersheds for known water quality problems. Other data such as water supply and endangered species information have also been obtained and assigned to hydrologic units.

Using these data priority watersheds have been identified and targetted. Cooperating agencies and organizations are working to implement programs to correct natural resource problems and direct resources and funds to these priority areas. As programs are implemented, resource improvements and other benefits will be assessed to determine the effectiveness of the hydrologic unit planning and implementation efforts.

Department of Environmental Quality To be Formed

When four state environmental agencies consolidate into the new Department of Environmental Quality on April 1, 1993, one result will be more cohesive management of Virginia's groundwater protection strategies. The department will consolidate the activities of the Department of Air Pollution Control, the State Water Control Board, the Department of Waste Management and the Council on the Environment.

Today, the Department of Waste Management and the State Water Control Board manage different aspects of groundwater protection, which means citizens and regulated industries have to deal with at least two agencies. This situation can be cumbersome and frustrating for everyone involved, including the agencies. But the Department of Environmental Quality will provide a new framework for addressing groundwater-related issues and overall environmental protection. The permitting process will be improved, and planning and policy analysis will be enhanced.

The structure and mission of the new department will be more clearly developed with the help of an advisory task force of business, local government and environmental representatives. Regional public meetings are planned for this summer to explain the consolidation strategy and gather people's opinions. These ideas and comments will be incorporated into an implementation plan that goes to the General Assembly in November.

Chesapeake Bay Act Update

In 1988, the General Assembly adopted the Chesapeake Bay Preservation Act requiring 84 Tidewater localities to adopt and implement a program to protect the water quality of the Chesapeake Bay and its tributaries. Groundwater is an important source of water for Chesapeake Bay locality residents as well as a source of fresh water to the Chesapeake Bay and its tributaries. To date, 27 of the 29 counties have adopted a program. All 17 cities have done so as have 18 of 38 towns. Localities outside of Tidewater also have the opportunity to adopt a program pursuant to the Bay Act and Regulations but to date only Albemarle County has done so.

To help localities adopt programs and amend their comprehensive plans, the Chesapeake Bay Local Assistance Department has developed the Local Assistance Manual that includes sections on groundwater. The Department provides other reports and direct technical assistance when requested. As well, the Department conducts an annual competitive grant process to provide direct financial assistance to localities implementing the Preservation Act. In the 1990-92 biennium, over 2 million dollars was distributed through Department financial assistance efforts for support activities such as ordinance revisions: acquisition of computers, software and other equipment; and hiring staff for administration and enforcement. Persons interested in the Preservation Act and Regulations can contact the Chesapeake Bay Local Assistance Department at 1-800-CHES-BAY or 804/225-3440.

Groundwater Discharge To Chesapeake Bay

During 1991, the Division of Soil and Water Conservation (DSWC) continued the funding of research by the Virginia Polytechnic Institute and State University (VPI&SU) on the link between land uses and the quality of groundwater discharge to Chesapeake Bay. This research is headed by Dr. George Simmons, Jr. and his colleagues and students. A total of 10 sites were studied in 1991, five of which were agricultural, three were urban/residential, and two were wetland sites. Through this research it has been estimated that the groundwater discharge to the Bay system approximates the volume contribution of the York or Rappahannock Rivers.

Groundwater discharge from urban/residential areas were found to have elevated concentrations of ammonia and dissolved phosphates, while discharges from agricultural areas had elevated concentrations of nitrate. Studies during 1991 demonstrated the importance of buffer zones between upland activities and the groundwater quality of shallow water aquifers. Benefits in nutrient removal were observed for both mature forest and wetlands which often provide buffer zones in the coastal areas of the state between upland land uses and the groundwater discharge to neighboring tidal creeks, streams, rivers, and embayments. Wetlands were found to have the greatest effect in protecting surface water quality, particularly through denitrification. The researchers concluded that efforts directed towards wetlands protection and restoration should be a high priority. This research is continuing into 1992.

groundwater discharge to the Bay system approximates the volume contribution of the York or Rappahannock Rivers

These findings confirm that protecting groundwater quality is important not only for assuring the availability of quality groundwater but also for maintaining surface water in a beneficial condition.

Dr. George Simmons has published a number of articles on this and related topics and can be reached at VPI & SU at 703/961-6407.

Nutrient & Pesticide Monitoring In Nomini Creek Watershed

Groundwater monitoring continued during 1991 in the Nomini Creek watershed in Westmoreland County as part of a comprehensive watershed study initiated by the Division of Soil and Water Conservation in 1985. The purpose of this study, conducted by the Agricultural Engineering Department at VPI & SU, is to quantify the effectiveness of agricultural best management practices (BMPs) on improving water quality. A pre-BMP monitoring phase was conducted from June 1986 to June 1989. BMP implementation began in the watershed in the Spring of 1989.

Results of the pre-BMP monitoring indicate nitrate concentrations were highest in the shallowest wells while total phosphorous concentrations were highest in the deeper wells. Nitrate concentrations were higher in wells adjacent to no-till fields as compared to conventional tillage. This may be attributed to greater infiltration rates from a higher number of macropores under the no-till fields.

Twenty pesticides were detected in the groundwater samples during the pre-BMP phase. A detection means a measurable presence of a pesticide and does not necessarily mean that standards have been violated or that health has been endangered. The herbicide, Atrazine, was the most frequent. It was present in 20 percent of the samples. There were no significant differences found in pesticide levels based on well location or tillage practices.

During the past year, water samples were collected from eight monitoring wells in agricultural areas at least once a month and were analyzed for nutrients and pesticides as part of the post-BMP monitoring phase. A post-BMP trend analysis is scheduled for FY 92-93 to evaluate the impact of BMPs on water quality in the watershed.

Constructed Wetlands Being Tested

The Division of Soil & Water Conservation has funded a Section 319 (Clean Water Act) grant project through the Virginia Department of Health to evaluate "constructed wetlands" as a method of alternative sewage disposal for single family dwellings. Traditionally, a residential sewage disposal system consist of a septic tank, distribution box and drainfields.

A constructed wetlands system operates with the sewage from the dwelling entering a septic tank, the septic tank effluent then passing through a distribution box to two to three wetland cells in series. These shallow cells are lined with a plastic liner and filled with pea gravel. Wetland plants are planted in each cell. The wetland cells offer a biologically active zone where solids, biological oxygen demand, fecal coliforms and nutrients are reduced. The effluent from the wetland cells enters a conventional drainfield system or may be permitted to discharge to a receiving stream after chlorine treatment.

The first of two constructed wetlands to be installed through the 319 project was constructed in Prince George County. The second has now been installed in Suffolk. Effluent quality and groundwater monitoring are being conducted to determine the treatability of this type of system and its applicability in areas with a high seasonal water table. One of the potential applications of the constructed wetlands technology is for rural households - many of whom are low income and are located in areas where problem soils render conventional systems ineffective.

Well Retesting Now Required By Some Banks

An informal survey based on phone calls by the Department of Housing and Community Development to some three dozen plus lending institutions, real estate companies and private well testing laboratories throughout Virginia produced varied results. When they were asked about the extent to which lending institutions required wells to be retested for bacterial contamination as a condition of financing, what was found is that there are some lending institutions that require private well testing for all conventional loans while others do not. Several real estate companies use contracts that have standard clauses requiring private well retesting, while others only require retesting when requested by the buyer. The private laboratories contacted indicated that water quality problems based on these tests range from less than 10 percent up to 25 percent.

Some general observations and information about private well retesting:

- Wells serving 25 or more people or 15 or more residential units are considered public. The Health Department has regulations requiring public well retesting.
- Any wells serving fewer than 25 people or 15 residences are considered private wells. Private well retesting is not required by the Health Department. The Health Department does require initial testing for new private wells, replacement wells or the repair of a well but not periodic retesting.
- Health Department facilities do not provide private well testing, unless there is a major health problem. Otherwise all testing is done by private laboratories or public service authorities.
- The Federal Housing Administration, Department of Veterans Affairs and Farmers Home Administration do require private well testing before they will insure any loans. The percent of FHA and VA-insured loans varies or was unknown by the lending institutions contacted. Ninety percent of VHDA loans are insured by FHA or VA.
- The Virginia Association of Realtors has developed a sample residential sales contract that contains a clause requiring private well testing. However, real estate firms are not required to use this form. Many firms have their own forms which may or may not require well testing.
- Several real estate brokers stated they would like a State law to require private well testing for all resales. They are concerned about being held liable if a residence is sold with bad water.
- "Freddie Mac" and "Fannie Mae" do not require private well testing in order to buy a mortgage from a lender. However, many of the lenders spoken to in Virginia were of the opinion that this was required.
- Piedmont Area - According to our informal survey, about 50% of people who get loans have a retesting clause in their contract.

- Northern Neck - Private well testing is required for all new loans and 90% of all refinancing or resales involving the same bank.
- Northern Virginia - All residential resales are reported to involve private well retesting.
- Southwest Virginia - Fewer than 20% of the lenders in Southwest, Virginia have a well testing requirement according to our respondents.

The Groundwater Protection Steering Committee will consider these results as part of its concern for protecting private as well as public water supplies as called for in the *1990 Supplement* to the state *Groundwater Protection Strategy.*

Nutrient Management Plans Assist Farmers

During 1991, the Division of Soil and Water Conservation received funding from the 319 grant and the Chesapeake Bay Program to fund 10 nutrient management specialist positions along with a nutrient management program manager. These specialists work with farmers to reduce nutrient inputs to the minimum needed for agronomic production. A total of 267 site-specific nutrient management plans were written to cover fertilizer usage on 73,423 acres. The DSWC estimated that these plans reduced the nitrogen application in the state by 616,652 pounds and phosphorous usage by 434, 771 pounds. The DSWC also experimentally evaluated the Soil Nitrate Test Kit in areas of the state where manure and sewage sludge is land applied. Based on the test results and resulting fertilizer recommendations it is estimated that the usage of nitrogen was reduced in the state by an additional 341,000 pounds. Fertilizers are one of the most important sources of nitrate contamination in groundwater. EPA has estimated that 4.5 million people in the United States get their water from groundwater that contains more than 10 milligrams per liter of nitrate, the maximum contaminant level set by EPA.

Agencies Join Forces For Total Resource Conservation Planning

A farmer who seeks advice on sound farming practices that help protect natural resources might get an erosion control plan from the Soil Conservation Service (SCS), a separate nutrient management plan from the Division of Soil and Water Conservation and another plan for pest management from the Cooperative Extension Service (Extension). If that farmer participated in any Farm Bill programs, he might have yet another plan for compliance with certain Farm Bill requirements, and still another plan if the farm is in a Chesapeake Bay Preservation Area. Having this number of different plans is at best confusing, and there is the real possibility that the different plans will offer conflicting advice. The existence of different plans also tends to foster the view that natural resources are discrete resources, without any inter-relationship. Why not simply have one plan that does it all?

So thought the State and federal agencies that develop and have an interest in conservation planning for agriculture in Virginia, and these agencies have now signed an agreement to begin delivering their resource management planning services in a coordinated fashion. The agencies have assigned responsibility for certain aspects of the process to each agency, and the product that will be delivered to farmers is a single plan, called the Total Resource Conservation Plan (TRCP). The participating agencies are the Virginia Division of Soil and Water Conservation, the Soil Conservation Service, Extension and the Virginia Department of Agriculture and Consumer Services. Each TRCP will contain information on the particular types of soils found on that farm and their vulnerability to leaching agricultural chemicals.

This cross-program prevention approach can be expected to increase in the future.

Housing And Community Development And VPI Extension Offer Training

The Department of Housing and Community Development (DHCD) provides planning assistance to local governments with an emphasis on training planning commissioners and members of local board of zoning appeals. These certified training programs, sponsored in conjunction with the Extension Service, continue to be well received. DHCD also continues to serve as a clearinghouse for information on planning and zoning issues. Federal and state grant programs operated by DHCD, continue to alleviate groundwater problems through installation of water and sewer systems for many localities in Virginia. DHCD anticipates the continuation of planning assistance and training programs to local planning commissioners. By improving the quality of local planning through education, planning commissions and staff will be better able to address long-term groundwater protection strategies.

The greatest planning challenge faced by DHCD is helping local decision-makers and staff realize the importance of protecting groundwater resources before problems occur. Since these protections often involve development restrictions, it is difficult to persuade community leaders to implement unpopular measures before actual groundwater problems exist. Educating appropriate planning officials about the difficulty of remediation and the effectiveness of preventative planning measures are included in future challenges.

The Cooperative Extension Service at Virginia Tech is also heavily engaged in outreach about water quality, in general, and groundwater protection, in particular. These topics have become integral parts of many Extension Service educational programs for both rural and urban audiences. These educational programs are directed to farmers, urban dwellers, youth, planning, and other local officials.

Several Extension Service projects this past year were directed to specific audiences: residential fertilizer and pesticide use for groundwater protection; nitrogen management in agriculture; a pesticide waste disposal guide; a 4-H curriculum for aquatic studies; cover crops for water quality; water quality for rural households; and a Farm-A-Syst program to protect rural groundwater sources. In addition, a 3-year Chesapeake Bay Residential Watershed Water Quality Management program was initiated. This project is a demonstration project which will concentrate on on-site sewage systems, fertilizer/pesticide use and integrated pest management. Farm-A-Syst is a pilot program which is designed specifically to help farmers identify potential groundwater issues on a site-specific basis and then adopt management measures to protect groundwater. If funding becomes available, the Farm-A-Syst program will be offered on a statewide basis.

Publications Available

- For copies of the Report of the Ad Hoc Committee on Wellhead Protection and for a copy of the forthcoming *Wellhead Protection: Tools for Local Governments in Virginia,* contact Mary Ann Sykes, Virginia Water Control Board, 804/527-5201. Also, the *1987 Groundwater Protection Strategy for Virginia* and its *1990 Supplement* have been reprinted and are again available.
- Two new publications available from the Council on the Environment are the *General Guide to Environmental Regulations in Virginia* and the *Business and Industry Guide to Environmental Requirements in Virginia.* Copies can be obtained by calling the Council at 804/786-4500.
- Copies of the *Local Assistance Manual* as well as other reports and bulletins can be obtained from the Chesapeake Bay Local Assistance Department by calling 1-800-CHES-BAY or 804/225-3440.
- A paper, "Targetting Virginia's Non-point Source Programs", describing the hydrologic unit non-point source planning process may be obtained by contacting Stuart Wilson, Division of Soil and Water Conservation, 203 Governor Street, Suite 206, Richmond, VA 23219-2094, 804/786-4382.
- The following publications are available from the Division of Mineral Resources by calling 804-293-5121.

  Oil and Gas and Well Data, Lee County, Virginia (Publication 113), by Jack E. Nolde. 13 pages. Two full-color maps, scaled 1:50,000. 1992. $8.25.

  Bibliography of Virginia Geology (Publication 120), by B. F. Hoffer. 1992. $12.75.

  Geologic Map of the Appalachian Valley (Bulletin 43), by Charles Butts. 1992. Reprint of 1933 original. $6.00.

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